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10/073,293	02/13/2002	Ekaterina Alexsandrovna Tabolina	US-145O	3493

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EXAMINER	
GANGLE, BRIAN J	
ART UNIT	**PAPER NUMBER**
1645	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/073,293	TABOLINA ET AL.	
	Examiner	Art Unit	
	Brian J. Gangle	1645	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) *4-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 31-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment filed 8/17/2006 is acknowledged. Claims 1-33 are pending. Claims 4-30 have been withdrawn as being drawn to nonelected inventions. Claims 1-3 and 31-33 are currently under examination.

Specification

The objection to the specification because it contains an embedded hyperlink is maintained for the reasons set forth in the previous office action. Applicant's amendment to the specification is acknowledged; however, the removal of "ftp://" from ftp.genetics.wisc.edu/pub/sequence/ecolim52.seq.gz, does not change the fact that a hyperlink is listed.

New Claim Objections

Claim 1 is objected to because of the following informalities: with the amendment, section (B) of the claim reads "1 to 12 amino acids in the amino acid sequence in SEQ ID NO:4, and and wherein said protein." It is assumed that the second "and" is a typographical error. Appropriate correction is required.

Claim Rejections Withdrawn

The rejection of claim 1 under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter, is withdrawn in light of applicant's amendment thereto.

The rejection of claims 1-3 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, is withdrawn in light of applicant's amendment thereto.

Claim Rejections Maintained

35 USC § 112 – First paragraph

Claims 1-3, and newly submitted claims 31 and 33, are rejected under 35 U.S.C. 112, first paragraph because the specification does not enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims for the reasons set forth in the rejection of claims 1-3 in the previous office action.

Applicant argues:

1. That the number of amino acids that can be altered is limited to 1-12, and is coupled to the function of the altered protein. Applicant asserts that a variation of up to 12 amino acids is actually a small variation (less than 5% for SEQ ID NO:4 and less than 10% SEQ ID NO:6) and that making these proteins and testing for their required activity is well within the skill in the art.

2. That the methods for enhancing activities of proteins are well known in the art, and examples of these methods are provided in the specification.

Applicant's arguments have been fully considered and deemed non-persuasive.

Regarding argument 1, deletion, substitution, insertion, or addition of 1-12 (or 1-11) amino acids is not a small variation. Even if the claims were limited to an addition of 12 amino acids to only one of the required proteins, there would be $4x10^{15}$ possible polypeptides. When one considers that any amino acid can be substituted or inserted into any position in any combination of 1-12 amino acids (not to mention deletions and additions), the number of possible polypeptides is extremely large. Applicant argues that it is well within the skill in the art to make these proteins and to test for their required activity. This is true. However, applicant provides no guidance whatsoever regarding which amino acids should be changed, deleted, or added to achieve or maintain the claimed function; and the making and testing of more than a four quadrillion polypeptides certainly constitutes undue experimentation.

Regarding argument 2, the methods exemplified in the specification are methods of increasing the expression of a given protein. Applicant has not provided a means for increasing the activity of all of the possible proteins encompassed by the claims. Merely increasing the copy number or expression of a protein does not guarantee that activity will be increased. The vast majority of mutations render a protein non-functional. If one were to increase expression of a non-functional protein, the result would not be increased activity.

Therefore, the full scope of the claims is not enabled. As outlined previously, The claims are drawn to a bacterium which has enhanced activity of either (a) a protein comprising SEQ ID NO: 4 or (b) a protein which comprises an amino acid sequence including deletion, substitution,

insertion, or addition of one or several amino acids in the amino acid sequence of SEQ ID NO: 4, which has an activity of making bacterium having enhanced resistance to L-amino acids and/or its analogs; and either (c) a protein comprising SEQ ID NO: 6 or (d) a protein which comprises an amino acid sequence including deletion, substitution, insertion, or addition of one or several amino acids in the amino acid sequence of SEQ ID NO: 6, which has an activity of making bacterium having enhanced resistance to L-amino acids and/or its analogs. Any combination of (a) or (b), and (c) or (d) is encompassed by the claims. While (a) and (c) are limited to proteins comprising SEQ IDs 4 and 6, (b) and (d) are broadly drawn to practically any protein that enhances bacterial resistance to amino acids. The recited language "an amino acid sequence including deletion, substitution, insertion or addition of one or several amino acids," requires only that a sequence of two amino acids be found in the claimed SEQ ID NO., and the amino acid sequence can then have one or "several" changes. With no limiting definition of "several" in the specification, the genus of proteins that meets the requirements of the claim is very broad. The claims are also drawn to said bacterium where the enhanced activity is due to alteration of "expression regulation sequence of said DNA on the chromosome of the bacterium."

The specification teaches a bacterium that has been transformed by a plasmid bearing the nucleic acid encoding SEQ IDs 4 and 6. The specification further teaches that, under appropriate conditions, said bacterium is capable of producing increased levels of threonine, valine, proline, leucine, and methionine. The specification lacks any teaching of a protein which comprises an amino acid sequence including deletion, substitution, insertion, or addition of one or several amino acids in the amino acid sequence of SEQ ID NO: 4 or 6, which has an activity of making bacterium having enhanced resistance to L-amino acids and/or its analogs; or that said proteins would cause enhanced amino acid production. There is no guidance in the specification regarding which amino acids can be deleted, substituted, inserted, or added while retaining activity. The specification further lacks any teaching that a protein comprising either SEQ ID 4 or 6 by itself would lead to enhanced amino acid production, or that the combination would lead to enhanced production of amino acids other than threonine, valine, proline, leucine, and methionine. Besides the amino acid sequences of SEQ IDs 4 and 6, the only information the specification gives on the two proteins is that they are putative transmembrane proteins with unknown function. The specification suggests that they might be membrane proteins with L-

amino acid excretion activity (p. 3, lines 11-26), but offers no evidence of this and no information on the regulation of these proteins.

The art is very limited with regard to said proteins. The nucleic acid sequences encoding both SEQ ID 4 and SEQ ID 6 were disclosed in Blattner *et al.* (IDS filed 6/17/2002, document AW) as putative proteins. There is no information in the art regarding the function, or regulation of these proteins. The nucleic acid sequences that comprises regulatory sequences or the proteins that act as promoters or repressors of said proteins are completely unknown. The art does show that mature biologically active forms of many proteins are post-translationally modified by glycosylation, phosphorylation, prenylation, acylation, ubiquitination or one or more of many other modifications and many proteins are only functional if specifically associated or complexed with other molecules including DNA, RNA, proteins and organic and inorganic cofactors. The type pr protein modification and the sites modified at a specific cellular state can usually not be determined from the gene sequence alone (Haynes *et al.*, Electrophoresis, 19:1862-1871, 1998, see p. 1863, paragraph bridging cols. 1-2). In addition, Skolnick *et al.* (Trends in Biotech., 18:34-39, 2000) state that sequence-based approaches to function prediction fails to take into account the powerful three-dimensional information displayed by protein structures (p. 34, col. 2, paragraph 4), and that even when the structure is determined, "knowing the protein structure by itself is insufficient to annotate a number of functional classes and is also insufficient for annotating the specific details of protein function" (p. 35, box 2). The art further shows that the alteration of even a single amino acid can change the activity of a protein. In the case of Sickle-cell anemia, a change of one amino acid from glutamate to valine leads to deformed erythrocytes (Voet *et al.*, Biochemistry, 2nd ed., John Wiley and Sons, Inc, 1995, p. 124). Similarly, in the case of antigen-antibody interaction, McGuinness *et al.* (*Lancet* 337: 514-517, March 1991) taught that a point mutation generating a single amino acid change in a P1.16-specific epitope in the VR2 region of the *porA* gene of a strain of *Neisseria meningitidis* of subtype P1.7,16 resulted in "striking changes in the structural and immunological properties of the class 1 protein" of this isolate (see abstract and page 514). Thus, the alteration of "one or several amino acids" can lead to substantial changes in a protein, which might or might not enhance the activity of the protein. Claim 1 requires that activity of said proteins be enhanced. There is no means provided in the specification to quantify the activity of said proteins alone or

in combination. Without knowing the function of said proteins, one would not know how to assay the activity of said proteins. Claim 2 requires that the activities of said proteins be enhanced by transformation of the bacterium with DNA coding for the proteins or by "alteration of expression regulation sequence of said DNA on the chromosome of the bacterium." As with claim 1, if one does not know how the proteins are regulated or what their function is, it is not possible to assay their activity and it would not be apparent that simple transformation would increase the activity. Also, with no knowledge of the regulation of said proteins, one would not know how to "alter expression regulation sequence of said DNA on the chromosome of the bacterium" or even if said alteration would accomplish the goal of enhanced activity. Moreover, the regulation of protein expression is a complex process that is completely undescribed regarding the putative proteins of the instant invention. There is no description of the structure or activity of the promoter necessary for transcription or whether there is a repressor, inducer, or sigma factor involved. There is no information in the art regarding whether the regulation of these proteins is cis-acting or trans-acting or whether the genes are under positive or negative control. Therefore, because neither the art or the specification teaches the nucleic acid sequences or proteins responsible for regulation of either the nucleic acid sequences of SEQ ID 3 or 5 or any variant thereof, it would require undue experimentation on the part of the skilled artisan to make and use the claimed invention; therefore the full scope of the claims is not enabled.

35 USC § 102

Claims 1-2, and newly submitted claims 31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Furukawa *et al.* (US Patent 4,996,147, 1991) for the reasons set forth in the rejection of claims 1-2 in the previous office action.

Applicant argues: that Furukawa fails to teach the presence of the proteins with the amino acid sequence of SEQ ID NO:4 and 6, enhanced activity of these proteins, or that the combined enhanced activity of these proteins will result in enhanced amino acid production. Applicant also asserts that no evidence of the inherency of these limitations has been provided.

Applicant's arguments have been fully considered and deemed non-persuasive.

Applicant has claimed an isolated L-amino acid bacterium from the genus *Escherichia*. Although Furukawa disclose the same product, they do not disclose that the product is produced

by the same method of making (i.e. enhanced activity of SEQ ID NO:4 and 6). However, it should be noted that the instant claims constitute Product-by-Process type claims. In Product-by-Process type claims, the process of producing the product is given no patentable weight since it does not impart novelty to a product when the product is taught by the prior art. See *In re Thorpe*, 227 USPQ 964 (CAFC 1985); *In re Marosi*, 218 USPQ 289, 292-293 (CAFC 1983) and *In re Brown*, 173 USPQ 685 (CCPA 1972). Consequently, even if a particular process used to prepare a product is novel and unobvious over the prior art, the product per se, even when limited to the particular process, is unpatentable over the same product taught in by the prior art. See *In re King*, 107 F.2d 618, 620, 43 USPQ 400, 402 (CCPA 1939); *In re Merz*, 97 F.2d 599, 601, 38 USPQ 143-145 (CCPA 1938); *In re Bergy*, 563 F.2d 1031, 1035, 195 USPQ 344, 348 (CCPA 1977) vacated 438 US 902 (1978); and United States v. Ciba-Geigy Corp., 508 F. Supp. 1157, 1171, 211 USPQ 529, 543 (DNJ 1979). Finally, since the Patent Office does not have the facilities for examining and comparing Applicant's composition with the compositions of the prior art reference, the burden is upon Applicant to show a distinction between the material, structural and functional characteristics of the claimed composition and the composition of the prior art. See *In re Best*. Moreover, as disclosed in the instant specification (page 3, line 11 – page 4, line 7) and in Blattner *et al.* (IDS filed 6/17/2002, document AW), the claimed proteins are found naturally in *E. coli*. Therefore, in the absence of evidence to the contrary, the isolated bacterium with enhanced L-amino acid production disclosed by Furukawa has enhanced amino acid production due to an alteration in the expression of regulation sequences of SEQ ID NO:4 and 6 and is the same as the composition of the instant claims.

As outlined previously, Furukawa *et al.* teach a bacterium belonging to the genus *Escherichia* and having resistance to rifampicin, lysine, methionine, aspartic acid and homoserine, and an ability to produce L-threonine until L-threonine is accumulated in the culture (paragraph bridging cols. 1-2). The bacterium of Furukawa has an enhanced ability to produce L-threonine (col. 3, lines 48-52). The products of the prior art reference appear to be the same or an obvious or analogous variant of the product claimed by the applicant because they appear to possess the same or similar functional characteristics, i.e. a bacterium belonging to the genus *Escherichia* which has enhanced L-amino acid production. The purification or production of a product by a particular process does not impart novelty or unobviousness to a product when the

same product is taught by the prior art. This is particularly true when properties of the product are not changed by the process in an unexpected manner. See In re Thorpe, 227 USPO 964 (CAFC 1985); In re Marosi, 218 USPO 289, 29222-293 (CAFC 1983); In re Brown, 173 USPO 685 (CCPA 1972). Even if applicant's product can be shown to be of higher purity than the product of the prior art reference, applicant's needs to show some unexpected and unique utility or property, such as unexpected biologically significant increase in specific activity with which the increased purity, greater stability and/or practicality or freedom from some restrictive element or adverse side effects inherent in the product preparations of the prior art or some other secondary consideration which the additional degree of purity imparts (to which there is a basis in the specification) to applicant's product in order to overcome the aspect of the product's purity is relied upon. Further, the proteins named in the instant application are proteins found naturally in *E. coli*. Thus, in the absence of evidence to the contrary, the bacterium of Furukawa *et al.* has enhanced amino acid production due to an alteration in the expression of regulation sequences of DNA on the chromosome of the bacterium.

Claims 1-3, and newly submitted claims 31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Sano *et al.* (European Patent Application Publication 0 643 135 A1, 1995) for the reasons set forth in the rejection of claims 1-3 in the previous office action.

Applicant argues: that Sano fails to teach the presence of the proteins with the amino acid sequence of SEQ ID NO:4 and 6, enhanced activity of these proteins, or that the combined enhanced activity of these proteins will result in enhanced amino acid production. Applicant also asserts that no evidence of the inherency of these limitations has been provided.

Applicant's arguments have been fully considered and deemed non-persuasive.

Applicant has claimed an isolated L-amino acid bacterium from the genus *Escherichia*. Although Sano disclose the same product, they do not disclose that the product is produced by the same method of making (i.e. enhanced activity of SEQ ID NO:4 and 6, obtained by transformation with a multi-copy vector). However, it should be noted that the instant claims constitute Product-by-Process type claims. In Product-by-Process type claims, the process of producing the product is given no patentable weight since it does not impart novelty to a product when the product is taught by the prior art. See *In re Thorpe*, 227 USPQ 964 (CAFC 1985); *In re*

Marosi, 218 USPQ 289, 292-293 (CAFC 1983) and *In re Brown*, 173 USPQ 685 (CCPA 1972). Consequently, even if a particular process used to prepare a product is novel and unobvious over the prior art, the product per se, even when limited to the particular process, is unpatentable over the same product taught in by the prior art. See *In re King*, 107 F.2d 618, 620, 43 USPQ 400, 402 (CCPA 1939); *In re Merz*, 97 F.2d 599, 601, 38 USPQ 143-145 (CCPA 1938); *In re Bergy*, 563 F.2d 1031, 1035, 195 USPQ 344, 348 (CCPA 1977) vacated 438 US 902 (1978); and United States v. Ciba-Geigy Corp., 508 F. Supp. 1157, 1171, 211 USPQ 529, 543 (DNJ 1979). Finally, since the Patent Office does not have the facilities for examining and comparing Applicant's composition with the compositions of the prior art reference, the burden is upon Applicant to show a distinction between the material, structural and functional characteristics of the claimed composition and the composition of the prior art. See *In re Best*. Moreover, as disclosed in the instant specification (page 3, line 11 – page 4, line 7) and in Blattner *et al.* (IDS filed 6/17/2002, document AW), the claimed proteins are found naturally in *E. coli*. Therefore, in the absence of evidence to the contrary, the isolated bacterium with enhanced L-amino acid production disclosed by Sano is the same as the composition of the instant claims.

New Claim Rejections

Claim Rejections - 35 USC § 112

Claims 1-3 and 31-33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a new matter rejection.

Applicant has amended claim 1 to recite "(B) a protein comprising an amino acid sequence including deletion, substitution, insertion or addition of 1 to 12 amino acids" and "(D) a protein comprising an amino acid sequence including deletion, substitution, insertion or addition of 1 to 11 amino acids." The ranges "1 to 12" and "1 to 11" do not appear in the specification, or original claims as filed. Applicant points to page 15, lines 5-11 in the specification to support these limitations, however, the ranges 1-12 and 1-11 are not supported. Therefore, these limitations are new matter.

Applicant has amended claim 31 to recite "the number of deletion, substitution, insertion or addition of amino acids in the amino acid sequences in SEQ ID NOS:4 and 6 is 1-5." The range "1-5" does not appear in the specification or original claims as filed. Applicant does not point out specific basis for this limitation in the application, and none is apparent. Therefore, this limitation is new matter.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-3 and 31-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is rendered vague and indefinite by the phrase "increasing the activities of a protein." According to the specification, the function of the claimed proteins is not known. Therefore, it is not clear what "activities" said protein is capable of or whether the protein has more than one activity. If the protein has only one activity, one cannot increase its "activities."

Claim 1 is rendered vague and indefinite by the phrase "or its analogs to the bacterium." It is unclear what the analog is an analog of. Is it the protein, the L-amino acid, or the bacterium that has an analog?

Claim 2 recites the limitation "said DNA" in the last line of the claim. There is insufficient antecedent basis for this limitation in the claim. The claim mentions a DNA coding for a protein, and a DNA sequence which regulates expression. Which of these is "said DNA"?

Claim 31 is rendered vague and indefinite by the phrase "wherein the number of deletion, substitution, insertion or addition of amino acids in the amino acid sequences in SEQ ID NOS:4 and 6 is 1-5." It is not clear whether this is intended to mean that 1-5 amino acids can be changed, or whether the number of changes (i.e. deletions, substitutions, insertions, or additions) must be from 1-5. Further, applicant has not specified whether the altered proteins are intended to be (B) and (D) from claim 1, or whether (A) and (C) can be altered in this manner.

Claim 32 is rendered vague and indefinite because the claim is dependent upon claim 31, where the proteins of SEQ ID NO:4 and 6 must have been altered. However, proteins with the

sequences of SEQ ID NO:4 and 6 that are altered would not be the proteins encoded by SEQ ID NO:3 and 5, as required by claim 32. Further, it appears that, to meet the limitations of claim 31, the bacterium must have (B) and (D) from claim 1. However, claim 32 is drawn to the bacterium with proteins (A) and (C), which the bacterium would not have.

Claim 33 is rendered vague and indefinite because the claim is dependent upon claim 32. As stated above, to meet the limitations of claim 32, the bacterium must contain (A) and (C), but not (B) and (D). However, claim 33 requires (B) and (D). It is not clear how this can be accomplished.

Conclusion

No claim is allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Gangle whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F 7-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Mark Navarro can be reached on (571) 272-0861. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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